GEOTECHNICAL DESKTOP STUDY
COAST BOULEVARD BETWEEN PROSPECT PLACE AND SCRIPPS PARK
CITY OF SAN DIEGO

Submitted to:

MICHAEL BAKER INTERNATIONAL
5050 Avenida Encinas, Suite 260
Carlsbad, CA 92008

Prepared By:

ALLIED GEOTECHNICAL ENGINEERS, INC.
9500 Cuyamaca Street, Suite 102
Santee, California 92071-2685

AGE Project No. 185 GS-16-J

October 18, 2019

October 18, 2019

Mr. Josh stone, P.E.
Michael Baker International
5050 Avenida Encinas, Suite 260
Carlsbad, CA 92008

Subject: **GEOTECHNICAL DESKTOP STUDY**
COAST BOULEVARD BETWEEN
PROSPECT PLACE AND SCRIPPS PARK
CITY OF SAN DIEGO
AGE Project No. 185 GS-16-J

Dear Mr. Stone,

In accordance with your request, Allied Geotechnical Engineers, Inc. is pleased to submit the accompanying geotechnical desktop study that was performed to assist Michael Baker International in assisting the City of San Diego with the preparation of environmental documents for the subject project.

We appreciate the opportunity to be of service on this project. If you have any questions regarding the contents of this report or need further assistance, please feel free to contact our office.

Sincerely,

ALLIED GEOTECHNICAL ENGINEERS, INC.

Nicholas E. Barnes, P.G., C.E.G.
Senior Geologist

Sani Sutanto, P.E.
Senior Project Manager

NEB/SS/TJL:cal
Distr. (1 electronic) Addressee

9500 Cuyamaca Street, Suite 102 ■ Santee, California 92071-2685 Phone 619.449.5900 Fax 619.449.5902

GEOTECHNICAL DESKTOP STUDY
COAST BOULEVARD BETWEEN PROSPECT PLACE AND SCRIPPS PARK
CITY OF SAN DIEGO

TABLE OF CONTENTS

TABLE OF CONTENTS
(Continued)

TABLE OF CONTENTS
(Continued)

Page No.

Figures

Appendices

1.0 INTRODUCTION

Allied Geotechnical Engineers, Inc. (AGE) is pleased to submit this desktop geotechnical study that was conducted to assist Michael Baker International (Michael Baker) in assisting the City of San Diego (City) with the preparation of environmental documents for the subject project. The study was performed in conformance with AGE's proposal dated October 9, 2019.

This report has been prepared for the exclusive use of Michael Baker and its design team and the City in their preparation of environmental documents for the subject project. The information presented in this report is not sufficient for any other uses or the purposes of other parties.

2.0 SITE AND PROJECT DESCRIPTION

The City intends to replace the pavement along an approximately 1,100-foot long section of Coast Boulevard and Cave Street in La Jolla, California (see Figure 1). The project alignment starts at the intersection with Prospect Place and extends along Cave Street and Coast Boulevard to the stop sign adjacent to Scripps Park. The streets within the project alignment are northwesterly to westerly one-way streets which are concrete-paved. The streets are lined with various single and multi-unit residential dwellings, hotels, restaurants, the La Jolla Cave Store, and La Jolla Cove beach. Site elevations vary from approximately 125 feet above mean sea level (msl) to 45 feet msl (Google Earth, 2017).

We understand that emergency work to stabilize a 50 to 60 foot wide section of Coast Boulevard located above a sea cave (www.lajollalight.com) commenced on August 9, 2019. The cave is referred to as Cooks's Crack Sea Cave, and occurs along a northeast/southwest trending fault. Jim Quinn, senior engineering geologist with the San Diego Developmental Services Department, reportedly stated that the cave was formed in the late Cretaceous age Point Loma Formation. Uplift and exposure to heavy surf caused erosion along the fault line, resulting in formation of the sea cave.

We further understand that the City performed regular inspection of Cook's Crack Sea Cave since the 1990's. During an inspection in March of 2019, Terra Costa Consulting Group (Terra Costa) observed some widening of the fractures and localized collapse of a block from the roof, as well as groundwater seepage and sand migration from the overlying terrace deposits.

Subsequently, Terra Costa performed twelve (12) soil borings above the cave in August of 2019, for the purpose of more accurately delineating the lateral and vertical extent of the sea cave. The borings were extended to depths ranging from 46 feet to 53.75 feet below the ground surface (bgs).

Review of the Terra Costa boring logs indicates that the terrace deposits underlying Coast Boulevard in the area of the sea cave extend to depth of up to 15 feet bgs. The terrace deposits are underlain by the Point Loma Formation. The terrace deposits are generally described as dark brown to red brown fine silty sand and clayey sand, and the Point Loma Formation is described as interbedded fine sandy silt, clayey silt and silt containing some localized cemented zones and concretions. Fill soil consisting of fine silty sand and sandy clay was encountered in two of the borings, extending to a maximum depth of 6 feet bgs.

The boring logs further indicate that the sea cave is formed entirely within the Point Loma Formation, between depth intervals of 32.5 feet and 52.5 feet bgs which correspond to approximate elevations of +16 feet above mean sea level (msl) and -3 feet msl.

Based on the information provided by Mr. Jim Quinn it is our understanding that the stabilization repairs entailed grout injection into the soil materials at the top of the cave to stiffen them, and filling of the sea cave with a cement slurry. The slurry was to be added incrementally, with a temporary keystone dam installed at the cave entrance. The filled mouth of the sea cave was then textured to match the adjacent sea cliffs for aesthetic purposes.

The concrete pavement along an approximately 200-foot wide segment of Coast Boulevard which is located in the area of the emergency work has been replaced and is not part of this project. The project also includes partial replacement of a storm drain pipeline in the eastern portion of the study area in the vicinity of Cave Street. The pipeline will be replaced in the same trench. The replacement pipeline extends over a distance of approximately 292 lineal feet between a drain inlet near the south end of Cave Street and a connection with a storm drain lateral located north of the parking area for the Cave Store. The new pipeline will be 12-inch diameter reinforced concrete pipe (RCP). The dimension of the existing pipeline is unknown. The existing storm drain outfall will not be replaced.

3.0 OBJECTIVE AND SCOPE OF INVESTIGATION

The objectives of this study were to perform a geologic reconnaissance of the study area, and to evaluate potential geologic and geotechnical hazards which may potentially affect or be impacted by the currently proposed project. The scope of our investigation included several tasks which are described in more detail in the following sections.

3.1 Information Review

For this task we have reviewed information pertaining to the proposed project that was readily available from a variety of sources which include:

- AGE's in-house references and aerial photographs;
- Published geologic literature and maps, including geologic and fault maps published by the City of San Diego, California Geological Survey and the United States Geological Survey;
- Pertinent project related information, including preliminary project plans and topographic maps; and
- Aerial photography available at Google Earth.

A listing of references that were reviewed is presented in Section 8.0.

3.2 Geologic Reconnaissance

The information obtained from our literature review was supplemented with visual observations gathered during a geologic reconnaissance of the study area that was conducted on October 15, 2019. Several pertinent photographs taken during the reconnaissance are shown in Appendix A.

At the time of our field reconnaissance, the stabilization of the Cook's Crack Sea Cave had been completed, and the installation of the new concrete pavement and sidewalk have been completed. Personnel from Flatiron Construction were in the process of cleaning up the site. Based on verbal information, it is our understanding that approximately 610 cubic yards of slurry was utilized to fill the sea cave.

Existing concrete street pavement to the east and west of the new pavement area displays appreciable cracks and local subsidence that appears to be decades old. Several saw-cut areas of repair extend the length of the street along utility trenches, with a number of saw-cut areas of repair extending crosswise along utility laterals from existing residences. The saw-cut areas of repair are old, and also display cracking damages. Some localized areas of asphalt filling are also present in the street paving.

The cracking and subsidence damages in the street paving are consistent with age and localized subsidence from vehicle wheel loads. Long-term soil movement and disturbance of the subgrade soil materials due to the utility trenching has likely contributed to the paving damages. Given the age of the concrete it is doubtful that the paving is underlain by adequate base materials.

We observed several inlets for the storm drain along the east side of Cave Street, but were unable to visually observe the outfall for the pipe. It appears that the outfall is located on the face of the steep bluff below a stormwater inlet on Coast Boulevard at approximate elevation of 80 feet msl. Based on visual observations, the stormdrain outlet is located in close proximity to the trace of a fault which forms the Sunny Jim Cave.

4.0 GEOLOGIC CONDITIONS

4.1 Geologic Setting and Site Physiography

The project study area is located near La Jolla Cove. Mapped geologic units in the study area consist of nearly flat-lying to moderately dipping, marine and non-marine sediments which range from Holocene to Cretaceous in age. Man-made fills are also present at various locations in the study area.

4.2 Tectonic Setting

Tectonically, the San Diego region is situated in a broad zone of northwest-trending, predominantly right-slip faults that span the width of the Peninsular Ranges and extend offshore into the California Continental Borderland Province west of California and northern Baja California. At the latitude of San Diego, this zone extends from the San Clemente fault zone, located approximately 60 miles to the west, and the San Andreas fault located about 95 miles to the east.

Major active regional faults of tectonic significance include the Coronado Bank, San Diego Trough, San Clemente, and Newport Inglewood/Rose Canyon fault zones which are located offshore; the faults in Baja California, including the San Miguel-Vallecitos and Agua Blanca fault zones; and the faults located further to the east in Imperial Valley which include the Elsinore, San Jacinto and San Andreas fault zones.

4.3 Geologic Units

For site characterization purposes, the subsurface soil materials in the project study area can be categorized into three geologic units which include (in order of increasing age): fill materials; old paralic deposits unit 6; and Point Loma Formation. A brief description of each unit is presented below. A generalized geologic map of the project study area and surrounding areas is shown on Figure 2.

4.3.1 Fill Materials (Qaf)

Fill materials associated with the various land developments likely exist in the study area. Terra Costa (2019) encountered fill material described as fine silty sand and clayey sand in two soil borings performed in Coast Boulevard above Cook's Crack Sea Cave.

Site reconnaissance observations suggest that fill materials are present above the storm drain outfall on the east side of the project study area, and may also underlie portions of Coast Boulevard. Documentation pertaining to the original placement of the fill materials is unavailable.

4.3.2 Old Paralic Deposits Unit 6 (Qop 6)

Unit 6 of the late to middle Pleistocene age old paralic deposits (Kennedy & Tan, 2008) is mapped in the project study area. The deposits are generally described as poorly sorted, moderately permeable, reddish brown interfingered strandline, beach, estuarine and colluvial deposits composed of siltstone, sandstone and conglomerate. Unit 6 rests on the Nestor Terrace.

4.3.3 Point Loma Formation (Kp)

The Point Loma Formation is the intermediate member of the upper Cretaceous age Rosario Group. The formation consists of an interbedded, fine-grained, dusky-yellow sandstone and olive gray siltstone (Kennedy and Tan, 2008). The formation is very dense and locally cemented. Published maps and field observations indicate that within the study area the formation displays a south to southwesterly dip of 20 to 30 degrees.

4.4 Groundwater

Review of the Geotracker website (www.Geotracker.com) did not reveal any nearby water monitoring wells. Terra Costa reported groundwater seepage into Cook's Crack Sea Cave from the overlying terrace deposits (www.lajollalight.com), but did not report any groundwater in borings performed above the cave.

It is anticipated that the regional groundwater table in the study area is at the approximate sea level elevation, well below the anticipated depth of excavations for the proposed project. It must be noted, however, that localized perched water conditions may be encountered, particularly during the wet (rainy) season. Seepage may also occur along joints in the formational soils.

Given the site geologic conditions, surficial terrace deposits are anticipated to display moderate permeability characteristics. The Point Loma Formation is anticipated to have very low permeability potential.

5.0 DISCUSSIONS, OPINIONS AND RECOMMENDATIONS

5.1 Potential Geologic Hazards

A review of the City of San Diego Seismic Safety Study Geologic Hazards and Faults Map Grid 29 (2008) indicates that the project study area is located in an area classified as a Coastal Bluff, Zone 43 - Generally unstable, with unfavorable jointing, and local high erosion. A copy of the map is shown on Figure 3.

The Country Club fault and several unnamed fault strands are mapped east of the study area. These faults are all classified in the Seismic Safety Study as Fault Zone 12 - Potentially active, inactive, presumed inactive or activity unknown. However, the fault which forms the Cook's Crack Sea Cave is not identified in the Seismic Safety Study (2008), nor is this fault identified by Kennedy and Tan (2008).

5.1.1 Faulting

The project study area is crossed by the northeast trending fault which forms the Cook's Crack Sea Cave. Based on the orientation of this fault and the lack of offset in surficial terrace deposits, it is our opinion that this fault is inactive.

The Country Club fault is mapped approximately 800 feet east of the project study area, with several other unnamed fault strands located less than approximately 300 feet east of the study area (San Diego Seismic Safety Study, 2008; Kennedy and Tan, 2008). One of these fault strands forms the Sunny Jim Cave along the east side of the project study area.

The U. S. Geologic Survey Quaternary Fault Database (2019) classifies the Country Club fault as "potentially active", with documented evidence of undifferentiated Quaternary movement (within 1.6 million years) but no movement in Holocene time. The database does not depict the "Sunny Jim Cave" fault, "Cook's Crack" fault and other nearby short fault strands. Based on this information, we believe that there is a low potential for ground rupture and lurching resulting from onsite faulting.

For the purpose of this project we consider the Rose Canyon fault zone (RCFZ) to represent the most significant seismic hazard. The RCFZ is a complex set of anastomosing and en-echelon, predominantly strike slip faults that extend from off the coast near Carlsbad to offshore south of downtown San Diego (Treiman, 1993). In San Diego Bay, this fault zone is believed to splay into multiple, subparallel strands; the most pronounced of which are the Silver Strand, Spanish Bight and Coronado Bank faults.

Previous geologic investigations on the RCFZ in the Rose Creek area (Rockwell et. al., 1991) and in downtown San Diego (Patterson et. al., 1986) found evidence of multiple Holocene earthquakes. A study by Kleinfelder (2017) at the San Diego International Airport identified two zones of active faulting. One of these faults was named the East Bay fault and the second fault was determined to be a northward extension of the Spanish Bight fault. A study by Ninyo & Moore (2018) at Seaport Village found evidence of recent movement along a fault that was determined to be a northward extension of the active Coronado Bank fault.

Based on these studies, several fault strands within the RCFZ have been classified as active faults, and are included in Alquist-Priolo Special Studies Zones. The project study are is not located within an Alquist-Priolo Earthquake Study Zone.

The location of the project study area in relation to the active faults in the region is shown on the Regional Fault Map (see Figure 4). California Department of Transportation ARS Online (V2.3.09) was used to approximate the distance of the closest ten (10) known faults to project study area. A summary of seismic source characteristics for faults that present the most significant seismic hazard potential to the project study area is presented in Table 1 below.

Table 1

Summary of Seismic Source Characteristics

Fault	Maximum Magnitude (MMax)	Deterministic Peak Site Acceleration (g)	Closest Distance to Site (mile)
Rose Canyon fault zone (San Diego section)	6.8	0.495	0.64
Rose Canyon fault zone (Del Mar section)	6.8	0.493	0.73
Rose Canyon fault zone (Silver Strand section-Spanish Bight fault)	6.8	0.231	8.16
Coronado Bank (alt2)	7.4	0.201	12.87
Point Loma Fault Zone	6.3	0.221	5.71
Rose Canyon fault zone (Silver Strand section-Silver Strand fault)	6.8	0.186	10.91
Rose Canyon fault zone (Silver Strand section-Downtown Graben fault)	6.8	0.184	11.12
Rose Canyon fault zone (Silver Strand section-Coronado fault)	6.8	0.182	11.21
Rose Canyon fault zone (Oceanside section)	6.8	0.171	12.14
San Diego Trough north alt1	7.3	0.126	22.23

5.1.2 Fault Ground Rupture & Ground Lurching

There are no known (mapped) active or potentially active faults crossing the project study area (Kennedy, 1975; Kennedy and Tan, 2008; City of San Diego Seismic Safety Study, 2008). Therefore, the potential for fault ground rupture and ground lurching is considered insignificant.

5.1.3 Soil Liquefaction

Seismically-induced soil liquefaction is a phenomenon in which loose to medium dense, saturated granular materials undergo matrix rearrangement, develop high pore water pressure, and lose shear strength due to cyclic ground vibrations induced by earthquakes.

Mapped geologic materials in the project study area consist of dense deposits and formational soils that are considered to have a very low to negligible liquefaction potential.

5.1.4 Landslides

A review of the published geologic maps indicate that there are no known (mapped) ancient landslides in the project study area (Kennedy, 1975; Kennedy and Tan, 2008; City of San Diego, 2008). Therefore, landsliding is not considered a significant risk.

Bluff erosion and periodic rock falls on the sea cliffs are an ongoing concern along the project alignment. During our site reconnaissance visit we observed undercutting of an approximately 100-foot section of Coast Boulevard at the west end of the study area near Scripps Park. The undercutting is occurring within the Point Loma Formation due to wave and surf activity. Ongoing bluff erosion at this locality may affect Coast Boulevard.

It is also noted that, although AGE's representatives were unable to visually confirm the location of the stormdrain pipeline outlet, erosion due to stormwater runoff was observed on the face of the bluff located below the assumed location of the stormdrain outfall.

5.1.5 Lateral Spread Displacement

The project study area is underlain by competent geologic units which are not considered susceptible to seismic-induced lateral spreading.

5.1.6 Differential Seismic-Induced Settlement

Differential seismic settlement occurs when seismic shaking causes one type of soil to settle more than another type. It may also occur within a soil deposit with largely homogeneous properties if the seismic shaking is uneven due to variable geometry or thickness of the soil deposit. Based on the results of our study, it is our opinion that there is a slight potential of differential settlement in mechanically placed man-made fills in the study area.

5.1.7 Secondary Hazards

The project study area is not located within a mapped tsunami inundation zone (California Geological Survey, 2009). The project study area is not located within the 100- and 500-year flood zone (FEMA Flood Insurance Rate Map, 2012).

5.2 Soil Corrosivity

Silty sands belonging to the old paralic deposits are typically not considered aggressive to concrete. However, fine-grained siltstone of the Point Loma Formation may be aggressive to concrete. In the event that corrosion sensitive facilities are planned, we recommend that a corrosion engineer be retained to perform the necessary corrosion protection evaluation and design.

5.3 Expansive Soil

Based on visual observations, the on-site terrace deposits are considered non-expansive. Soils derived from the Point Loma Formation may be moderately expansive.

5.4 Environmental Considerations

The scope of AGE's investigation did not include the performance of a Phase I Environmental Site Assessment (Phase I ESA) to evaluate the possible presence of soil and/or groundwater contamination beneath the project study area.

5.5 Summary & Conclusions

Based on the results of our study, it is our opinion that there are no known significant geologic hazards within the project study area which cannot be avoided or mitigated provided that the project is designed and constructed in accordance with the City of San Diego codes and regulations. Ongoing bluff erosion may pose a hazard to the streets. However, bluff stabilization required multi-agencies coordinated mitigation measures which are beyond the scope of the project. Furthermore, the streets themselves are not at higher risk to bluff erosion than the other existing facilities located along the project alignment.

Based on a review of the project plans, it is also our opinion that the proposed improvements are not anticipated to destabilize or results in settlement of adjacent property of the right-of-way, nor will the proposed improvements add surcharge on existing improvements or structures. Furthermore, the proposed improvements are not anticipated to increase geologic hazards along the project alignment and/or affect the adjacent bluff.

Based on visual observations, the existing stormdrain outfall is located in close proximity to the trace of a fault which forms the Sunny Jim Cave which is considered inactive. The need for mitigation measures to protect the storm drain pipeline from fault ground rupture is not anticipated.

Bluff erosion due to stormwater runoff was observed in the area below the assumed location of the stormdrain outfall. However, since the scope of work for the proposed project does not increase the drainage area of the existing stormdrain system, the proposed project is not anticipated to increase the erosion rate of the face of the bluff beneath the outfall.

6.0 UNCERTAINTIES AND LIMITATIONS

The information presented in this report is intended for the sole use of Michael Baker and other members of the project design team and the City for the preparation of environmental documents for the proposed project only. The report does not provide sufficient data for a final design and/or to prepare an accurate bid. Our firm did not perform an investigation to evaluate the subsurface conditions along the project alignment. This report is based solely on a review and evaluation of readily available information, various assumptions to bridge over data gaps, and our previous experience in the general project areas.

The findings of this desktop study are based on a cursory evaluation of readily available information which is generally very limited and contain data gaps in many areas. The project study area is subject to multiple geologic hazards, we therefore recommend that site and project specific geotechnical studies be performed for final design of the proposed project.

This study was performed in accordance with the authorized scope of work for this project. The findings and professional opinions presented in this report were developed in general conformance with the current practices and standard of care exercised by other local geotechnical engineering consultants performing similar tasks at the present time. No other warranty, either expressed or implied, is made with regard to the findings and opinions presented in this report.

7.0 REFERENCES

City of San Diego, Public Works Department, "Standard Drawings for Public Work Construction", 2012 Edition.

City of San Diego Seismic Safety Study, Geologic Hazards and Faults, Sheet No. 29, 2008 edition.

Department of Conservation, California Geological Survey Regulatory Hazard Zones Maps for Earthquake Faults, Liquefaction and Landslide Zones, 2009.

Department of Conservation, California Geological Survey Tsunami Inundation Map for Emergency Planning, 2009.

Geotracker Data Base - (http://geotracker.waterboards.ca.gov).

International Conference of Building Officials, 1997, Maps of Known Active Fault Near Source Zones in California and Adjacent Portions of Nevada.

Kennedy, M.P., 1975, Geology of the San Diego Metropolitan Area, California: California Division of Mines & Geology, Bulletin 200.

Kennedy, M.P., et.al., 1975, Character and Recency of Faulting, San Diego Metropolitan Area, California: California Division of Mines and Geology, Special Report 123.

Kennedy, M.P, and Tan, S.S, 2008, “Geologic Map of the San Diego 30' x 60' Quadrangle, California”, Digital Preparation by U.S. Geological Survey.

Kleinfelder, “Fault Hazard study, CIP 400002B ADP - Programmatic Document - ADC San Diego International Airport, San Diego, California”, prepared for San Diego County Regional Airport Authority, dated May 22, 2017.

Lindvall, S.C., and Rockwell, T.K., 1995, “Holocene Activity of the Rose Canyon fault zone in San Diego, California” in Journal of Geophysical Research, v. 100, No. B12, pp. 24,121 - 124,132.

Marshall, M., 1989, "Detailed Gravity Studies and the Tectonics of the Rose Canyon--Point Loma--La Nacion Fault System, San Diego, California" in Proceedings of Workshop on "The Seismic Risk in the San Diego Region: Special Focus on the Rose Canyon Fault System" (Glenn Roquemore, et.al, Editors).

Michael Baker International, a set of plans entitled “La Jolla Coast Blvd Improvements, 90% Submittal, October 18th, 2019,”.

Ninyo & Moore, “Fault Hazard Evaluation, World Class Waterfront Development, San Diego, California” report dated February 26, 2018.

Patterson, R.H., D.L. Schug, and B.E. Ehleringer, 1986, "Evidence of Recent Faulting in Downtown San Diego, California" in Geological Society of America, Abstracts With Programs, v. 18, No. 2, p. 169.

Rockwell, T.K., et.al., 1991, "Minimum Holocene Slip Rate for the Rose Canyon Fault in SanDiego, California" in Environmental Perils in the San Diego Region (P.L. Abbott and W.J. Elliott, editors): San Diego Association of Geologists, pp. 37-46.

Terra Costa Consulting Group, “Log of Test Borings B-1 thru B-12, Cook’s Crack Sea Cave”, borings dated 8/16/19 thru 8/18/19.

Treiman, J.A., 1993, “The Rose Canyon Fault Zone, Southern California”, California Division of Mines and Geology Open File Report No. 93-02.

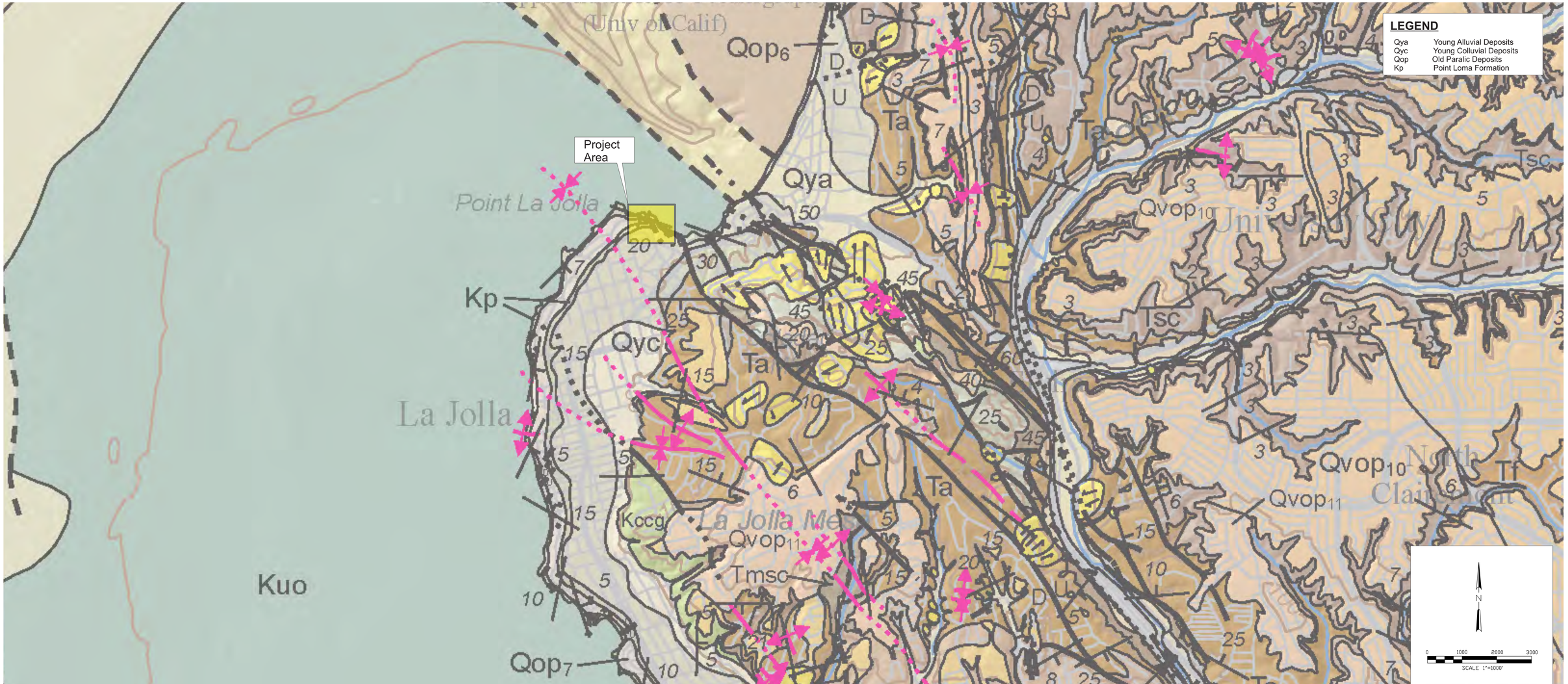
Standard Specifications for Public Works Construction ("Green Book"), including the Regional Standards, 2010 Edition.

U. S. Geologic Survey, 2019, “Quaternary Fault Database”.

Aerial Photographs

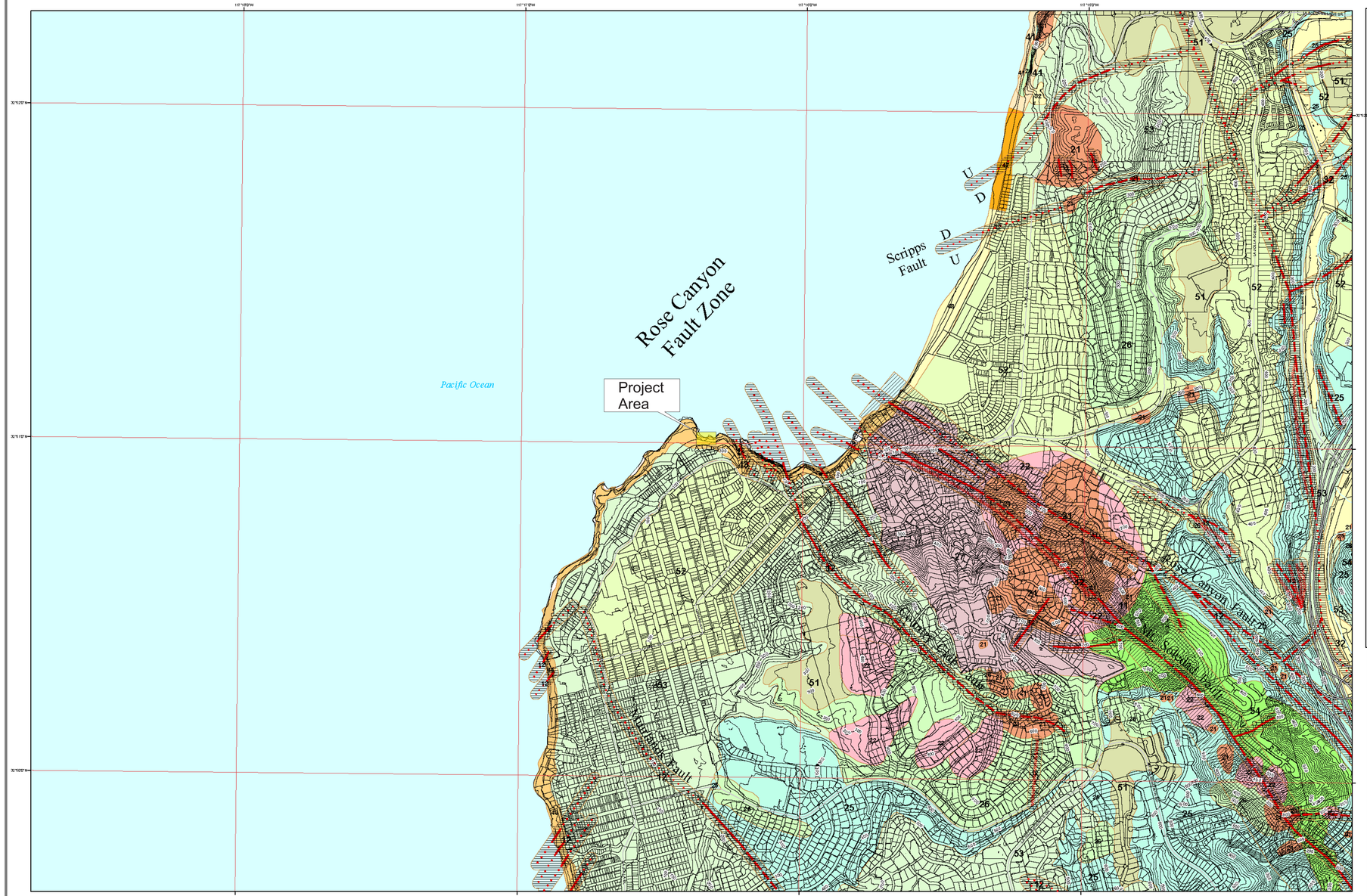
U.S. Department of Agriculture black and white aerial photograph Nos. AXN-8M- 1 and 2 (dated 1953)

COAST BOULEVARD BETWEEN PROSPECT PLACE AND SCRIPPS PARK	LOCATION MAP
PROJECT NO. 185 GS-16-J	ALLIED GEOTECHNICAL ENGINEERS, INC.
	FIGURE 1



Source: "Geologic Map of the San Diego 30' x 60' Quadrangle, California" by Michael P. Kennedy and Siang S. Tan, 2008.

COAST BOULEVARD BETWEEN PROSPECT PLACE AND SCRIPPS PARK	**GENERALIZED GEOLOGIC MAP**
PROJECT NO. 185 GS-16-J	**ALLIED GEOTECHNICAL ENGINEERS, INC.** — **FIGURE 2**



LEGEND

Geologic Hazard Categories

FAULT ZONES

11 Active, Alquist-Priolo Earthquake Fault Zone
12 Potentially Active, Inactive, Presumed Inactive, or Activity Unknown
13 Downtown special fault zone

LANDSLIDES

21 Confirmed, known, or highly suspected
22 Possible or conjectured

SLIDE-PRONE FORMATIONS

23 Friars: neutral or favorable geologic structure
24 Friars: unfavorable geologic structure
25 Ardath: neutral or favorable geologic structure
26 Ardath: unfavorable geologic structure
27 Otay, Sweetwater, and others

LIQUEFACTION

31 High Potential -- shallow groundwater major drainages, hydraulic fills
32 Low Potential -- fluctuating groundwater minor drainages

COASTAL BLUFFS

41 Generally unstable Numerous landslides, high steep bluffs, severe erosion, unfavorable geologic structure
42 Generally unstable Unfavorable bedding plains, high erosion
43 Generally unstable Unfavorable jointing, local high erosion
44 Moderately stable Mostly stable formations, local high erosion
45 Moderately stable Some minor landslides, minor erosion
46 Moderately stable Some unfavorable geologic structure, minor or no erosion
47 Generally stable Favorable geologic structure, minor or no erosion, no landslides
48 Generally stable Broad beach areas, developed harbor

OTHER TERRAIN

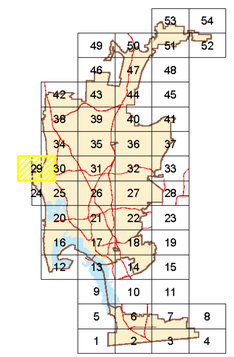
51 Level mesas -- underlain by terrace deposits and bedrock nominal risk
52 Other level areas, gently sloping to steep terrain, favorable geologic structure, Low risk
53 Level or sloping terrain, unfavorable geologic structure, Low to moderate risk
54 Steeply sloping terrain, unfavorable or fault controlled geologic structure, Moderate risk
55 Modified terrain (graded sites) Nominal risk

Water (Bays and Lakes)

FAULTS

Fault
Inferred Fault
Concealed Fault
Shear Zone

Index Map



SanGIS Basemap Accuracy

SanGIS Land (Lot) basemap data for the City of San Diego tested 20.7' horizontal accuracy at the 95% confidence level.

This data meets the ASPRS Standard for Class 1 Map Accuracy at a scale of 1:12,000 (1"=1,000').

This assessment assumes utilization of the data on a citywide basis. Localized data may exceed or fail to meet this accuracy with errors in excess of 100' possible.

City of San Diego
SEISMIC SAFETY STUDY
Geologic Hazards and Faults

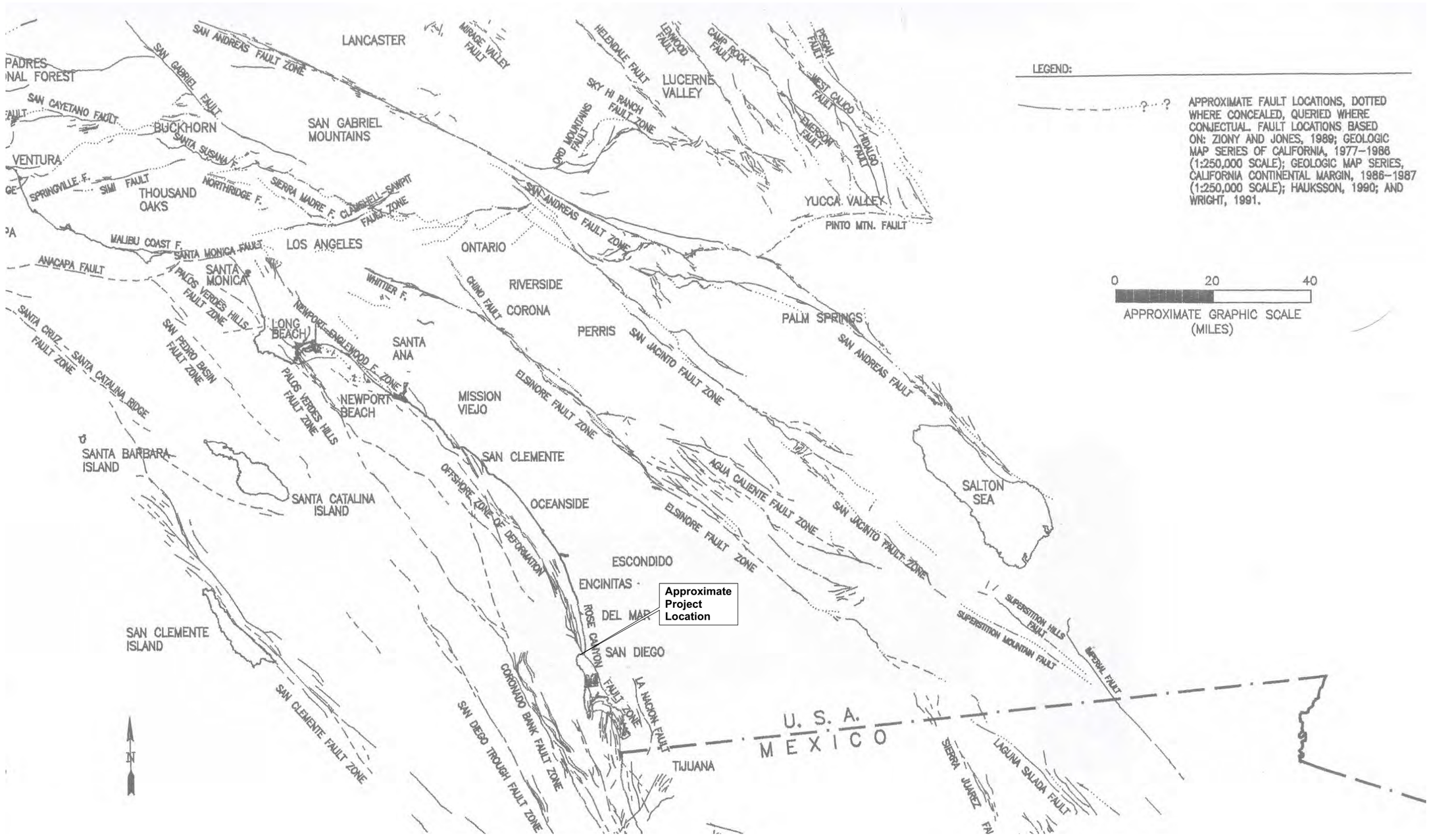
Development Services Department

Feet: 0, 400, 800, 1,600, 2,400
Meters: 0, 120, 240, 480, 720, 960

GRID TILE: 29
GRID SCALE: 800
DATE: 4/3/2008

COAST BOULEVARD BETWEEN PROSPECT PLACE AND SCRIPPS PARK | **CITY OF SAN DIEGO SEISMIC SAFETY STUDY**

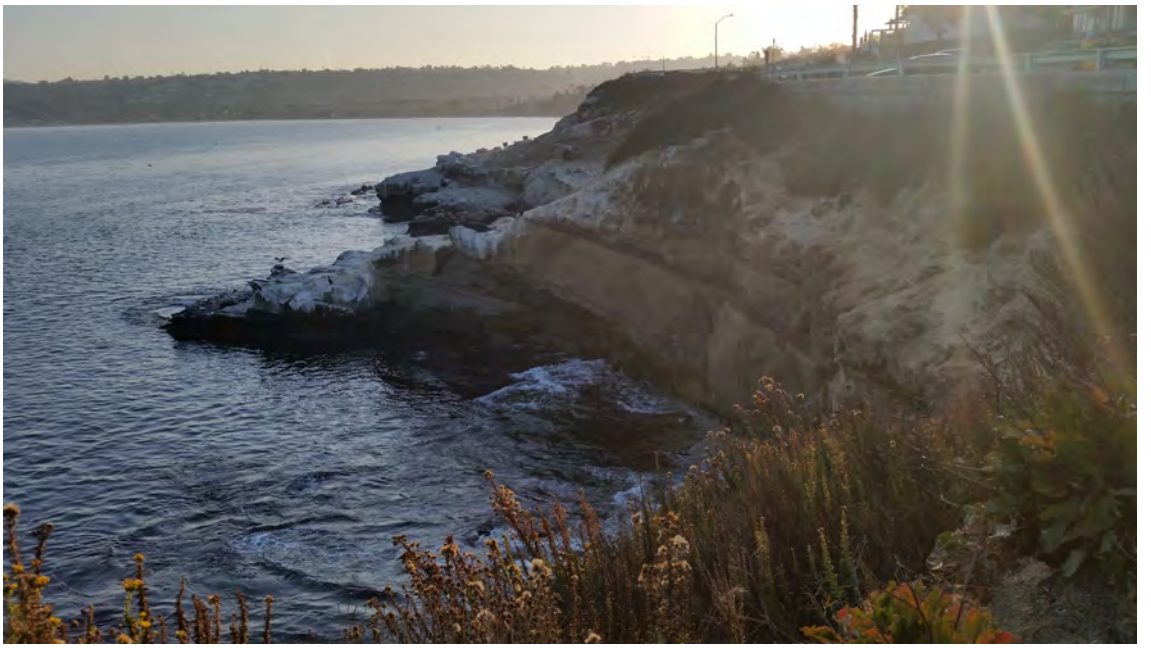
PROJECT NO. 185 GS-16-J | **ALLIED GEOTECHNICAL ENGINEERS, INC.** | **FIGURE 3**



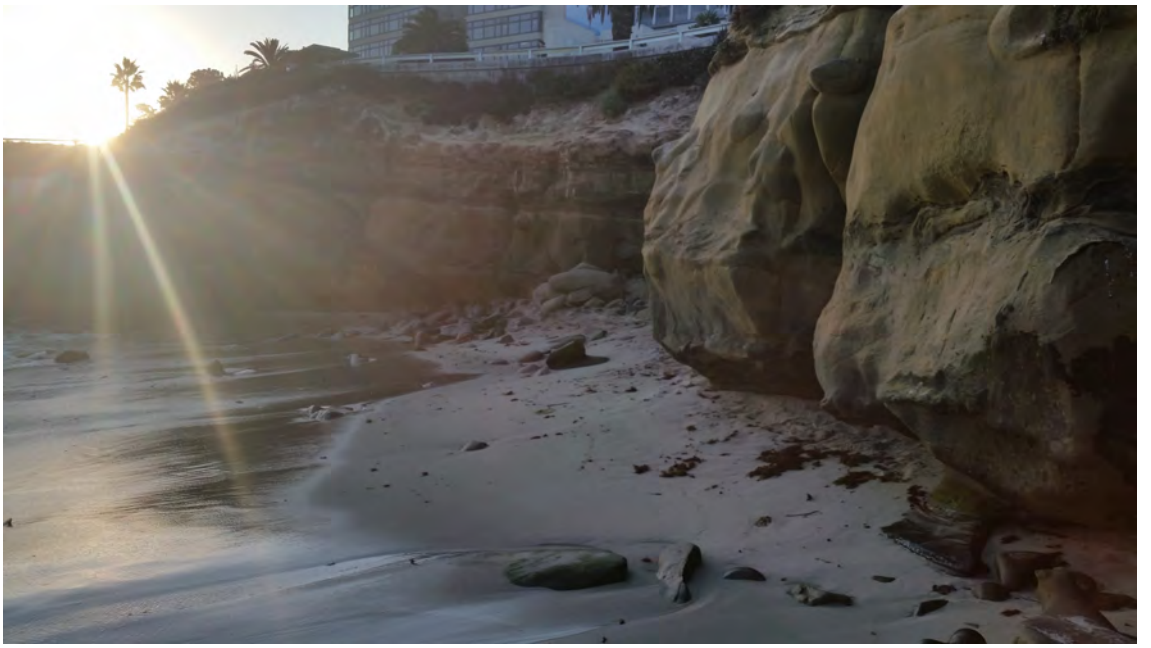
COAST BOULEVARD BETWEEN PROSPECT PLACE AND SCRIPPS PARK	REGIONAL FAULT MAP
PROJECT NO. 185 GS-16-J	ALLIED GEOTECHNICAL ENGINEERS, INC.
	FIGURE 4

APPENDIX A

PHOTOGRAPHS



Looking east from Scripps Park toward 10 feet deep undercut below the bluff.



Looking east from the beach at Scripps Park toward 10 feet deep undercut below bluff.

PHOTOGRAPHS
COAST BOULEVARD BETWEEN PROSPECT PLACE AND SCRIPPS PARK

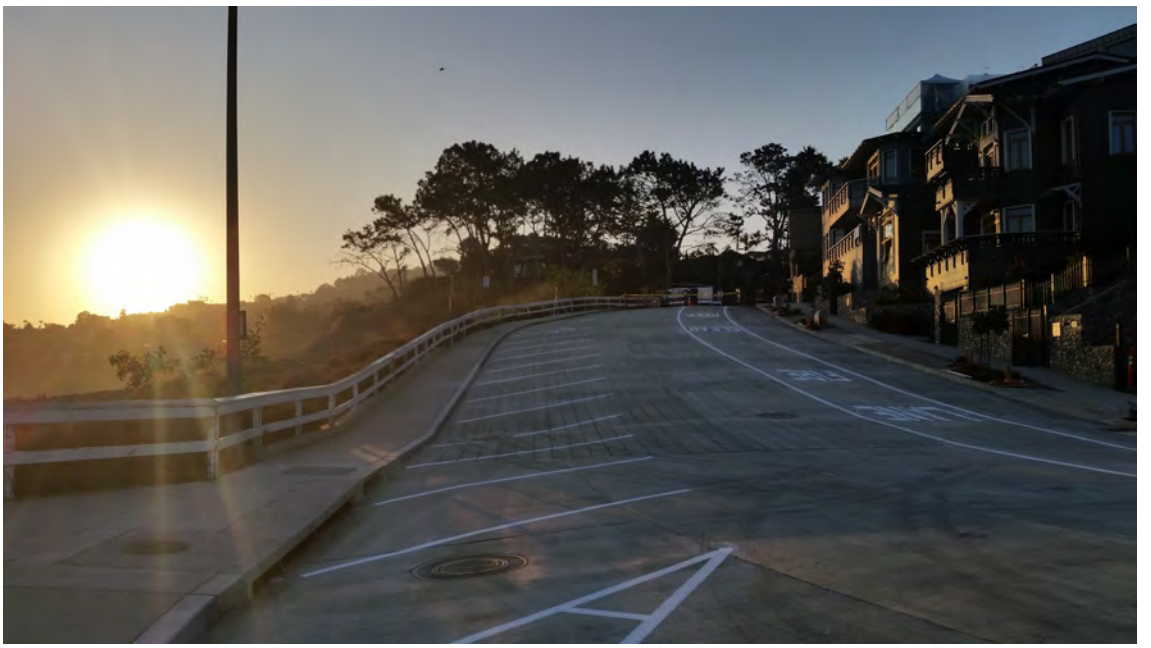
PROJECT NO. 185 GS-16-J	**ALLIED GEOTECHNICAL ENGINEERS, INC.**	**PHOTOGRAPH A-1**

Typical pavement conditions between Scripps Park and Cook's Crack Sea Cave.

Looking west from Cook's Crack Sea Cave.

PHOTOGRAPHS
COAST BOULEVARD BETWEEN PROSPECT PLACE AND SCRIPPS PARK

PROJECT NO. 185 GS-16-J	**ALLIED GEOTECHNICAL ENGINEERS, INC.**	**PHOTOGRAPH A-2**

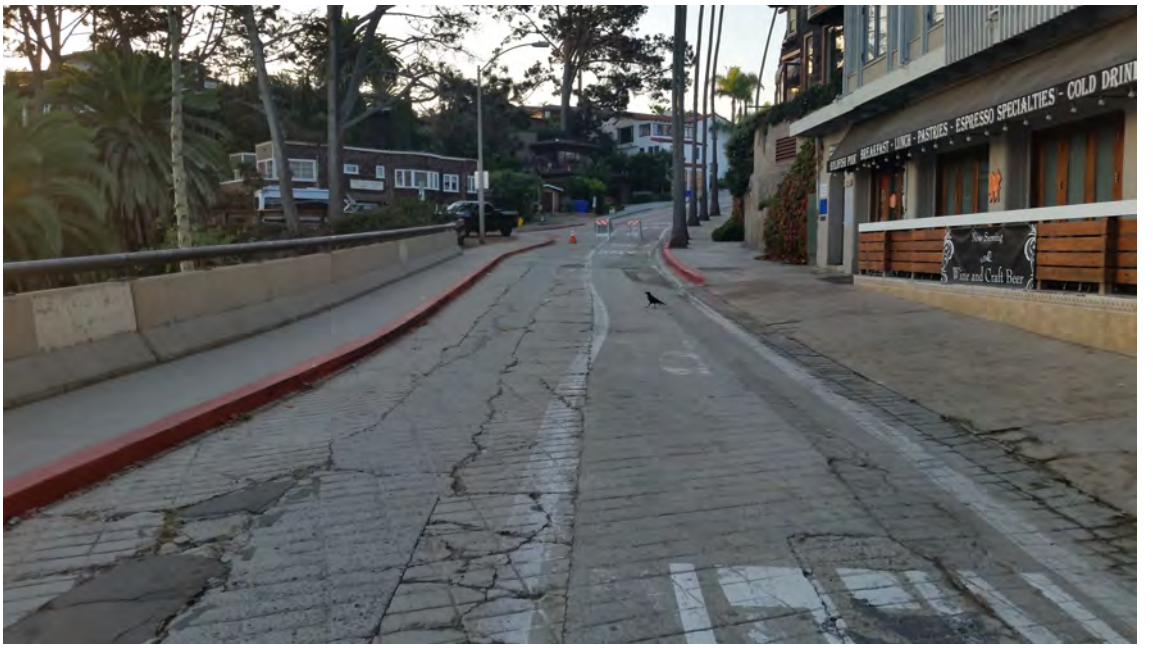


Looking northeast at the new pavement and sidewalk above Cook's Crack Sea Cave.

Looking southwest at the new pavement and sidewalk above Cook's Crack Sea Cave.

PHOTOGRAPHS
COAST BOULEVARD BETWEEN PROSPECT PLACE AND SCRIPPS PARK

PROJECT NO. 185 GS-16-J	ALLIED GEOTECHNICAL ENGINEERS, INC.	PHOTOGRAPH A-3



Looking northeast from outside the eastern limit of Cook's Crack Sea Cave.

Looking south from promontory by Sunny Jim Cave at bluff erosion from storm drain outfall.

PHOTOGRAPHS
COAST BOULEVARD BETWEEN PROSPECT PLACE AND SCRIPPS PARK

PROJECT NO. 185 GS-16-J	**ALLIED GEOTECHNICAL ENGINEERS, INC.**	**PHOTOGRAPH A-4**